REMARKS

The present application includes claims 1-52. Claims 1-52 were rejected. By this amendment, claims 1 and 27 have been amended, and new claims 53-55 have been added.

Claims 1-52 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention.

Claims 2, 12, 28, and 38 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 2, 14, 17-21, 27, 28, 40, and 43-47 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sowles, U.S. Patent No. 5,659,545.

Claims 3-6, 7-9, 11, 15, 16, 26, 29-32, 33-35, 37, 41, 42, and 52 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sowles and further in view of Hershey, U.S. Patent No. 5,867,489.

The rejection of claims 1, 2, 14, 17-21, 27, 28, 40, and 43-47 under 35 U.S.C. §102(b) as being anticipated by Sowles is respectfully traversed. Sowles teaches an apparatus and method for mobile acquisition in a satellite communication system. In Sowles, as shown in Figure 6 and described beginning at column 10, line 45, when a subscriber unit attempts to initiate contact, the subscriber unit is first assigned a channel by the satellite (102-108 in Figure 6.) Once the subscriber unit receives the traffic channel assignment, the subscriber unit sends a synchronization ("sync check") burst to the satellite. The satellite measures the timing offset and if the timing offset is within tolerances, the satellite determines that synchronization has been achieved, as described at column 10, lines 53-65. If synchronization has been achieved, the

satellite sends a "sync OK" message to the subscriber unit. The subscriber unit then switches to traffic mode and does not perform any more synchronization checks.

If synchronization has not been achieved, the satellite sends a "repeat burst" message to the subscriber unit. (Column 10, lines 60-65). The subscriber unit then re-transmits the sync burst to the satellite until the maximum number of retries permitted has been reached. If the subscriber unit does not receive a message from the satellite, the subscriber unit re-transmits the sync check.

The signals sent by the satellite are further described in Figures 7 and 8 and in the description beginning at column 11, line 55. Focusing again on the actions performed by the satellite during the sync check, further description appears at column 13, lines 5-32. That is, the satellite determines if the arrival time of the sync burst from the subscriber unit has a timing offset greater than a preferred tolerance. If the timing offset is greater than the tolerance, the satellite simply instructs the subscriber unit to repeat the burst. Thus, Sowles does not determine if the sync burst was early or late, just whether the sync burst was within tolerances.

Additionally, as described at column 12, line 66 to column 13, line 5, if the satellite does not receive a sync check from the subscriber unit within a predetermined amount of time, the satellite simply drops the channel assigned to that subscriber unit.

Thus, in Sowles, the satellite does not determine if a received synch burst was early or late, merely whether the sync burst was within tolerances. Additionally, in Sowles, the satellite sends only two messages to the subscriber unit: 1) sync OK, and 2) repeat burst. The satellite in Sowles does not send a message to the subscriber unit indicating if a burst was early or late, Sowles simply sends "repeat burst." Additionally, if the satellite in Sowles does not receive a

sync burst, Sowles simply drops the channel. Sowles does not teach sending a signal to the subscriber unit informing the subscriber unit that the sync burst was absent.

Independent claims 1 and 27 have been amended to include the limitation of determining at the satellite whether the synch bursts are early or late. Additionally, both claims include the limitation of reporting to the earth terminal whether the synch burst is early or late as well as reporting to the earth terminal that the synch burst is absent.

As discussed above, none of these claim limitations are taught in Sowles. Consequently, Applicant respectfully submits that claims 1 and 27 are allowable. Additionally, claims 2-26 and 28-52 depend from claims 1 and 27 and are also therefore respectfully submitted to be allowable.

The rejection of claims 3-6, 7-9, 11, 15, 16, 26, 29-32, 33-35, 37, 41, 42, and 52 under 35 U.S.C. §103(a) as being unpatentable over Sowles and further in view of Hershey is respectfully traversed. Hershey teaches a method and apparatus for TDMA slot synchronization with precision ranging. As illustrated in Figure 1 and described beginning at column 5, line 32, the system of Hershey forms a hyper-accurate localization of the spacecraft in order to minimize timing errors. In order to form the hyper-accurate estimate of the spacecraft position, three ground stations 14, 16, and 18, transmit pseudo random (PR) code division multiple access (CDMA) codes to the satellite. (Column 6, lines 13-16). As described at column 6, lines 32-60, the master ground station 14 receives the PR codes from all three ground stations and uses an averaging-type operation called a Hotelling algorithm to develop a hyper accurate estimate of the satellite position. The estimate of satellite position is then sent from the master ground station 14 to all ground stations by way of the satellite. (Column 6, lines 60-65).

As described beginning at column 7, line 22, the ground stations then determine their propagation time to the satellite based on the distance to the satellite (sent by the master ground

terminal) and a synchronization symbol sequence sent by the master ground terminal. As further described beginning at column 7, line 53, each ground station receives the signal from the master ground terminal and decodes the signal. Each ground station is then able to independently adjust its own data transmission time to match the slot timing at the satellite. (Column 7, lines 59-62).

Thus, in Hershey, no synchronization signal is sent from the ground terminals to the satellite. Consequently, the satellite does not make any determination if a synchronization signal was received or if the synchronization signal was early or late.

As discussed above, independent claims 1 and 27 have been amended to include the limitation of determining at the satellite whether the synch bursts are early or late. Additionally, both claims include the limitation of reporting to the earth terminal whether the synch burst is early or late as well as reporting to the earth terminal that the synch burst is absent.

As discussed above, none of these claim limitations are taught in either Sowles or Hershey alone or in combination. Claims 3-6, 7-9, 11, 15, 16, 26, 29-32, 33-35, 37, 41, 42, and 52 depend from claims 1 and 27 and consequently include these limitations. Consequently, Applicant respectfully submits that claims 3-6, 7-9, 11, 15, 16, 26, 29-32, 33-35, 37, 41, 42, and 52 are allowable.

The rejection of claims 1-52 under 35 U.S.C. §112, first paragraph, is respectfully traversed. The Examiner rejected the use of the term "downlink symbol counter" in claims 1-52 as not clear based on Applicant's description on page 12 pertaining to the "downlink symbol counter." The Examiner found that one of ordinary skill in the art would understand the term "downlink symbol counter" to mean a counter for counting symbols transmitted from a satellite to an earth terminal. In the present application, the satellite generates the master clock from which all timing signals in the entire system may be derived as discussed at page 8, lines 16-18.

The satellite sends a continuous stream of downlink frames at the symbol rate determined by the master clock. Because the satellite is sending downlink frames, the symbol rate is called the downlink symbol rate. Because the satellite's master clock is used as the clock for the entire system, all transmissions in the system take place at the symbol rate defined by the master clock, which is the downlink symbol rate. That is, even uplink transmissions from a ground terminal to the satellite use the master clock determined by the satellite and thus take place at the downlink symbol rate. In this way, even uplink transmissions occur at the downlink symbol rate.

Thus, each earth terminal maintains a counter that is clocked in response to the satellite's master clock. Because the master clock operates at the downlink symbol rate, the counter at the earth terminal is called the downlink symbol counter. The downlink symbol counter at the earth terminal may then be incremented or decremented in response to transmissions received at the satellite that are early or late, respectively.

Consequently, claim 1 recites, "maintaining a downlink symbol counter clocked at a downlink clock rate." The downlink symbol counter is maintained at the earth terminal, but is clocked according to the master clock on the satellite. If the earth terminal receives an early/late signal from the satellite, the earth terminal adjusts the downlink symbol counter to compensate, as recited in element (c). The earth terminal may adjust the downlink symbol counter by determining the timing that the most recent transmission should have arrived at the satellite (as recited in element (b)) by taking into account whether the satellite indicated that the burst was early or late. That is, the earth terminal determines when the transmission should have arrived at the satellite and then determines the downlink symbol count representing when the transmission should have been transmitted to arrive at the satellite at the desired time, as recited in element

(b). The downlink terminal then adjusts the downlink symbol counter to the new downlink symbol count (element (c)) and transmits bursts to the satellite (element (d)).

If additional clarity is needed, Applicant would be happy to amend the claims, especially in light of a suggestion from the Examiner. For example, "downlink symbol counter" could be amended to "symbol counter" if the Examiner would prefer.

The rejection of claims 2, 12, 28, and 38 under 35 U.S.C. §112, second paragraph, is respectfully traversed. The Examiner found that claims 2, 12, 28, and 38 recited the limitation "said downlink signal" without antecedent bases. Claims 2, 12, 28, and 38 depend from claims 1 and 27. Claims 1 and 27 have been amended to recite a downlink signal in elements (f) and (j), respectively. Consequently, Applicant respectfully submits that claims 2, 12, 28 and 38 now have antecedent basis and should be allowable.

Additionally, new claims 53-55 have been added. New claims 53 and 54 are mirror-image system and method claims. Both claims include the limitations incorporated into claims 1 and 27 of determining at the satellite if the synchronization burst was early, late or absent and reporting to the earth terminal whether the synchronization burst was early late or absent. As discussed above, these limitations are not taught by the prior art.

New claim 55 is similar to claim 54, but is focused only on determining if the synchronization burst was early or late and then relaying the early/late decision to the earth terminal.

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Accordingly, the application as amended is now believed to be in condition for allowance and an action to this effect is respectfully requested.

Respectfully submitted,

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ATTACHMENT FOR CLAIM AMENDMENTS
VERSION WITH MARKINGS TO SHOW CHANGES MADE
Serial No. 09/408,965; Filed: September 29, 1999

1. (Amended) A method synchronizing an earth terminal in a satellite communication network, the method comprising:

(a) maintaining a downlink symbol counter clocked at a downlink clock rate;

(b) determining a downlink symbol count representative of a time of arrival at a satellite of a burst transmitted from an earth terminal;

(c) adjusting said downlink symbol counter to correspond to said downlink symbol count; [and]

(d) transmitting synchronization bursts from said earth terminal to said satellite in accordance with said downlink symbol counter;

(e) determining at said satellite, whether said synchronization bursts received at said satellite are one of early, late, absent, and on time; and

(f) reporting in a downlink signal to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of a plurality of early, late, absent and on time.

27. (Amended) A synchronization method for a satellite communication network, the method comprising:

(a) establishing a communication satellite in orbit;

(b) establishing an earth terminal in communication with said satellite;

(c) generating a master clock on said satellite;

(d) transmitting downlink symbols synchronously with said master clock from said satellite to said earth terminal;

(e) maintaining at said earth terminal a downlink symbol counter clocked at a downlink clock rate;

(f) determining a downlink symbol count representative of a time of arrival of a burst transmitted from an earth terminal to a satellite;

(g) adjusting said downlink symbol counter to correspond to said downlink symbol count upon receipt of a predetermined reference point in a downlink frame; [and]

(h) transmitting synchronization bursts from said earth terminal to said satellite in accordance with said downlink symbol counter;

(i) determining at said satellite, whether said synchronization bursts received at said satellite are one of early, late, absent, and on time; and

(j) reporting in a downlink signal to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of a plurality of early, late, absent and on time.